Endel Tulving

Endel Tulving OC FRSC (born May 26, 1927) is an Estonian-born Canadian experimental psychologist and cognitive neuroscientist, known for his pioneering research on human memory. He is credited with proposing the distinction between semantic and episodic memory. Tulving is a professor emeritus at the University of Toronto. In 2006, he was named an Officer of the Order of Canada, Canada's highest civilian honour.

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Biography

Tulving was born in Tartu, Estonia, in 1927.[1][2] In 1944, after the Soviet Army entered Estonia, Tulving (then 17 years old) and his younger brother Hannes were separated from their family and sent to live in Germany.[1] In Germany, he finished high school and worked as a teacher and interpreter for the U.S. army.[1][3] He briefly studied medicine at Heidelberg before he immigrated to Canada in 1949.[1][3] In 1950, he married Ruth Mikkelsaar, a fellow Estonia from Tartu whom he had met at a refugee camp in Germany.[1][3] They had three daughters: Elo Ann, Ruth, and Linda.[3]

Tulving completed a bachelor's (1953) and master's degree (1954) from the University of Toronto, and earned a PhD in experimental psychology (1957) from Harvard University.[1][4] His doctoral dissertation was on the topic of oculomotor adjustments and visual acuity.[1]

In 1956, Tulving accepted a lectureship at the University of Toronto as a lecturer, where he would remain for the rest of his career.[1] He served as Chair of the Department of Psychology from 1974 to 1980, and became a Professor in 1985.[4] As of 2019, he holds the titles of Professor Emeritus at the University of Toronto and Visiting Professor of Psychology at Washington University in St. Louis.[5]

Research

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Tulving has published at least 200 research articles and chapters, and he is widely cited, with an h-index of 69 (as of April, 2010), and in a *Review of General Psychology* survey, published in 2002, he ranked as the 36th most cited psychologist of the 20th century.[6] His published works in 1970s were particularly notable because it coincided with the new determination by many cognitive psychologists to confirm their theories in neuroscience using brain-imaging techniques.[7] During this period, Tulving mapped the areas of the brain, which are considered active during the encoding and retrieval of memory, effectively associating the medial temporal lobe and the hippocampus with episodic memory.[7] Tulving has published work on a variety of other topics, including the importance of mental organization of information in memory,[8] a model of brain hemisphere specialization for episodic memory,[9] and discovery of the Tulving-Wiseman function.[10]

Episodic and semantic memory

Tulving first made the distinction between episodic and semantic memory in a 1972 book chapter.[11] Episodic memory is the ability to consciously recollect previous experiences from memory (e.g., recalling a recent family trip to Disney World), whereas semantic memory is the ability to store more general knowledge in memory (e.g., the fact that Disney World is in Florida). This distinction was based on theoretical grounds and experimental psychology findings, and subsequently was linked to different neural systems in the brain by studies of brain damage and neuroimaging techniques. At the time, this type of theorizing represented a major departure from many contemporary theories of human learning and memory, which did not emphasize different kinds of subjective experience or brain systems.[12] Tulving's 1983 book *Elements of Episodic Memory* elaborated on these concepts, and has been cited over 3000 times. According to Tulving, the ability to travel back and forward in time mentally is unique to humans and this is made possible by the autonoetic consciousness and is the essence of episodic memory.[13]

Encoding specificity principle

Tulving's theory of "encoding specificity" emphasizes the importance of retrieval cues in accessing episodic memories.[14] The theory states that effective retrieval cues must overlap with the to-be-retrieved memory trace. Because the contents of the memory trace are primarily established during the initial encoding of the experience, retrieval cues will be maximally effective if they are similar to this encoded information. Tulving has dubbed the process through which a retrieval cue activates a stored memory "synergistic ecphory".

One implication of the encoding specificity principle is that forgetting may be caused by the lack of appropriate retrieval cues, as opposed to decay of a memory trace over time or interference from other memories.[15] Another implication is that there is more information stored in memory relative to what can be retrieved at any given point (i.e., availability vs. accessibility).[16]

Amnesia and consciousness

Tulving's research has emphasized the importance of episodic memory for our experience of consciousness and our understanding of time. For example, he conducted studies with the amnesic patient KC, who had relatively normal semantic memory but severely impaired episodic memory due to brain damage from a motorcycle accident. Tulving's work with KC highlighted the central importance of episodic memory for the subjective experience of one's self in time, an ability he dubbed "autonoetic consciousness". KC lacked this ability, failing to remember prior events and also failing to imagine or

plan for the future.[17] Tulving also developed a cognitive task to measure different subjective states in memory, called the "remember"/"know" procedure. This task has been used extensively in cognitive psychology and neuroscience.[18]

Implicit memory and priming

Another area where Tulving has had an impact is the distinction between conscious or explicit memory (such as episodic memory) and more automatic forms of implicit memory (such as priming). Along with one of his students, Professor Daniel Schacter, Tulving provided several key experimental findings regarding implicit memory.[19] The distinction between implicit and explicit memory was a topic of debate in the 1980s and 1990s. Tulving and colleagues proposed that these different memory phenomena reflected different brain systems.[20] Others argued that these different memory phenomena reflected different psychological processes, rather than different memory systems. These processes would be instantiated in the brain, but they might reflect different aspects of performance from the same memory system, triggered by different task conditions. More recently, theorists have come to adopt components of each of these perspectives.[21]

Estonian Studies Foundation

In 1982, architect Elmar Tampõld proposed the idea of reinvesting Tartu College's surplus revenues for the founding of a Chair of Estonian Studies at the University of Toronto. The university agreed and in 1983, he helped establish the Chair of Estonian Studies Foundation with fellow expatriate Estonian professors, Endel Tulving and chemical engineer Olev Träss. The three men made the initial presentation to the University of Toronto and Tampõld became the Chairman of the Board of Directors for the Chair of Estonian Studies Foundation.[22] Since 1999, Jüri Kivimäe, Professor of History and Chair of Estonian Studies has headed the University of Toronto's Elmar Tampõld Chair of Estonian Studies.[23]

Honours and awards

Tulving is a member of seven distinguished societies: Fellow, Royal Society of Canada; Foreign Member, Royal Swedish Academy of Sciences; Fellow, Royal Society of London; Foreign Honorary Member, American Academy of Arts and Sciences; Foreign Associate, National Academy of Sciences; Foreign Member, Academia Europaea; and Foreign Member, Estonian Academy of Sciences.[4][24]

Other honours include:

- 1983: Award for Distinguished Scientific Contributions to Psychology, American Psychological Association[25]
- 1983: Award for Distinguished Contributions to Psychology as a Science, Canadian Psychological Association[26]
- 1994: Gold Medal Award for Life Achievement in Psychological Science, American Psychological Foundation[27]
- 1994: Izaak Walton Killam Memorial Prize, Canada Council[24]
- 2005: Canada Gairdner International Award, Gairdner Foundation[4][25]
- 2006: Officer of the Order of Canada[28][24]
- 2007: Inducted into the Canadian Medical Hall of Fame[2]

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External links

- The Works of Endel Tulving – full access to chapters and articles written by Endel Tulving (http://alicekim.ca/tulving/)
- science.ca profile (http://www.science.ca/scientists/scientistprofile.php?pID=20)
- Rotman Research Institute page (http://rotman-baycrest.on.ca/index.php?section=219)
- Great Canadian Psychology Website – Endel Tulving Biography (http://www.psych.ualberta.ca/~gcpws/Tulving/Tulving.html)

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